Exelon Nuclear
200 Exelon Way
Kennett Square, PA 19348

www.exeloncorp.com

Exelon Nuclear

PROPRIETARY INFORMATION – WITHHOLD UNDER 10 CFR 2.390

10 CFR 50.90

July 15, 2010

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Peach Bottom Atomic Power Station, Unit 2
Renewed Facility Operating License No. DPR-44
NRC Docket No. 50-277

Subject: Response to Request for Additional Information Concerning the Safety Limit Minimum Critical Power Ratio Change License Amendment Request

References:
1) Letter from P. B. Cowan (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "License Amendment Request - Safety Limit Minimum Critical Power Ratio Change," dated May 27, 2010

2) Letter from J. D. Hughey (U.S. Nuclear Regulatory Commission) to M. J. Pacilio (Exelon Generation Company, LLC), "Peach Bottom Atomic Power Station, Unit 2 - Request for Additional Information Regarding License Amendment Request for Safety Limit Minimum Critical Power Ratio Change" (TAC NO. ME3994), dated July 1, 2010

In the Reference 1 letter, Exelon Generation Company, LLC (Exelon) requested a proposed change to modify Technical Specification (TS) 2.1.1 ("Reactor Core SLs"). Specifically, this change incorporates revised Safety Limit Minimum Critical Power Ratios (SLMCPRs) due to the cycle specific analysis performed by Global Nuclear Fuel for Peach Bottom Atomic Power Station (PBAPS), Unit 2, Cycle 19.

In the Reference 2 letter, the U.S. Nuclear Regulatory Commission staff requested additional information. Attached is our response to this request.

Attachment 1 (letter from J. M. Downs (Global Nuclear Fuel) to J. Tusar (Exelon Nuclear), dated July 15, 2010) contains information proprietary to Global Nuclear Fuel. Global Nuclear Fuel requests that the document be withheld from public disclosure in accordance with 10 CFR 2.390(a)(4). An affidavit supporting this request is also contained in Attachment 1. Attachment 2 contains a non-proprietary version of the Global Nuclear Fuel document.

A001
NRR

**Attachment 1 transmitted herewith contains Proprietary Information.
When separated from attachments, this document is decontrolled.**

Should you have any questions concerning this letter, please contact Tom Loomis at (610) 765-5510.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 15th of July 2010.

Respectfully,

SDS

Pamela B. Cowan
Director - Licensing & Regulatory Affairs
Exelon Generation Company, LLC

Attachments: 1) Response to Request for Additional Information - Proprietary Version of Global Nuclear Fuel Letter
2) Response to Request for Additional Information - Non-Proprietary Version of Global Nuclear Fuel Letter

cc: USNRC Region I, Regional Administrator
USNRC Senior Resident Inspector, PBAPS
USNRC Project Manager, PBAPS
R. R. Janati, Commonwealth of Pennsylvania
S. T. Gray, State of Maryland

ATTACHMENT 2

Response to Request for Additional Information

Non-Proprietary Version of Global Nuclear Fuel Letter

ENCLOSURE 2

JMD-EXN-HE0-10-020

Response to NRC RAI's for Peach Bottom Atomic Power Station Unit 2
Cycle 19 SLMCPR Submittal

Non-Proprietary Information

INFORMATION NOTICE

This is a non-proprietary version of JMD-EXN-HE0-10-020 Enclosure 1, which has the proprietary information removed. Portions of the document that have been removed are indicated by white space inside open and closed bracket as shown here [[ ]].

RAI-01: Provide the PBAPS Unit 2 cycle-specific fuel quantity for each fuel type and state when the specific fuel types are loaded in the core (i.e., fresh, once, or twice burn) as depicted in Figures 1 and 2 (the Cycle 19 and Cycle 18 reference core loading pattern, respectively) of Attachment 4.

GNF RESPONSE: GNF provides the following tables for clarification.

Cycle 19 Core (Current Cycle), Figure 1 of Attachment 4

Fig. 1 Index	Fuel Type	Cycle Loaded	Number
	Irradiated:		
B	GE14-P10DNAB416-15GZ-100T-150-T6-2908 (GE14C)	17	51
C	GE14-P10DNAB417-13G6.0-100T-150-T6-2909 (GE14C)	17	32
D	GE14-P10DNAB415-15GZ-100T-150-T6-2910 (GE14C)	17	9
E	GE14-P10DNAB416-15GZ-100T-150-T6-2911 (GE14C)	17	60
F	GE14-P10DNAB416-15GZ-100T-150-T6-2912 (GE14C)	17	36
G	GE14-P10DNAB409-15GZ-100T-150-T6-2913 (GE14C)	17	32
L	GE14-P10DNAB420-13GZ-100T-150-T6-3097 (GE14C)	18	56
M	GE14-P10DNAB416-15GZ-100T-150-T6-3098 (GE14C)	18	48
N	GE14-P10DNAB416-15GZ-100T-150-T6-2911 (GE14C)	18	32
O	GE14-P10DNAB411-15GZ-100T-150-T6-3099 (GE14C)	18	64
P	GE14-P10DNAB409-15GZ-100T-150-T6-2913 (GE14C)	18	72
	New:		
S	GNF2-P10DG2B392-15GZ-100T2-150-T6-3332 (GNF2)	19	32
K+R	GNF2-P10DG2B392-15GZ-100T2-150-T6-3335 (GNF2)	19	72
J+Q	GNF2-P10DG2B388-6G8.0/6G7.0/2G6.0-100T2-150-T6-3336 (GNF2)	19	80
A+I	GNF2-P10DG2B393-15GZ-100T2-150-T6-3334 (GNF2)	19	24
H	GNF2-P10DG2B406-12G6.0-100T2-150-T6-3337 (GNF2)	19	64
	Total:		**764**

Cycle 18 Core (Previous Cycle), Figure 2 of Attachment 4

Fig. 2 Index	Fuel Type	Cycle Loaded	Number
	Irradiated:		
G	GE14-P10DNAB415-15GZ-100T-150-T6-2789 (GE14C)	16	164
H	GE14-P10DNAB415-16GZ-100T-150-T6-2790 (GE14C)	16	56
A	GE14-P10DNAB416-15GZ-100T-150-T6-2908 (GE14C)	17	56
B	GE14-P10DNAB417-13G6.0-100T-150-T6-2909 (GE14C)	17	32
C	GE14-P10DNAB415-15GZ-100T-150-T6-2910 (GE14C)	17	48
D	GE14-P10DNAB416-15GZ-100T-150-T6-2911 (GE14C)	17	64
E	GE14-P10DNAB416-15GZ-100T-150-T6-2912 (GE14C)	17	40
F	GE14-P10DNAB409-15GZ-100T-150-T6-2913 (GE14C)	17	32
	New:		
M	GE14-P10DNAB409-15GZ-100T-150-T6-2913 (GE14C)	18	72
L	GE14-P10DNAB411-15GZ-100T-150-T6-3099 (GE14C)	18	64
K	GE14-P10DNAB416-15GZ-100T-150-T6-2911 (GE14C)	18	32
J	GE14-P10DNAB416-15GZ-100T-150-T6-3098 (GE14C)	18	48
I	GE14-P10DNAB420-13GZ-100T-150-T6-3097 (GE14C)	18	56
	Total:		**764**

RAI-02: Provide the details to obtain a final core loading pattern as shown in Figure 1 of Attachment 4 including procedure, guideline, criteria, and approved methodologies used for this analysis.

GNF RESPONSE: The loading pattern is developed collaboratively by GNF and Exelon based on Exelon input. Among the inputs are:

- Cycle energy requirements – fuel bundle design (nuclear) and loading patterns
- Thermal limit margins
- Reactivity margins – minimum shutdown margin, minimum and maximum hot excess reactivity
- Discharge exposure limitations and other limits as established by safety analysis
- Desired control rod patterns – sequences and durations
- Minimize channel distortion

Methods used to analyze the core loading pattern are in accordance with GESTAR-II. GESTAR-II is the umbrella for all procedures, guidelines, criteria, and approved methodologies used for this analysis. There is no change in approved methodologies. This is a SLMCPR Technical Specifications change within approved methodologies. SLMCPR is not the primary driver in developing the fuel cycle core design. The energy plan, reactivity, and thermal margins are the primary drivers.

RAI-03: Confirm that the current cycle loading diagram shown in Figure 1 of Attachment 4 is used for calculating the PBAPS Unit 2 Cycle 19 SLMCPR values of 1.10 for two recirculation loop operation (TLO) and 1.14 for single recirculation loop operation.

GNF RESPONSE: GNF confirms that the core loading represented in Figure 1 of Attachment 4 was used in calculating the PBAPS, Unit 2 Cycle 19 SLMCPR values of 1.10/1.14 (TLO/SLO).

RAI-04: Confirm that PBAPS, Unit 2, is currently in the Cycle 18 operating cycle (referred to as the previous cycle in Attachment 4) and that Cycle 19 (referred to as the current cycle in Attachment 4) is the operating cycle that will commence following the upcoming Unit 2 refueling outage described in the amendment request.

GNF RESPONSE: GNF confirms that PBAPS, Unit 2 is currently operating in Cycle 18, referred to as 'previous cycle' in Attachment 4. GNF further confirms that Cycle 19, referred to as 'current cycle' in Attachment 4, will commence following the upcoming Unit 2 refueling outage.

RAI-05: Provide the rationale for why the proposed SLMCPR increment of 0.03 for the proposed loading pattern in Figure 1 of Attachment 4 is on the high end of the normal approximate range of 0.01 to 0.03 for any expected core loading configurations.

GNF RESPONSE: The proposed 0.03 increase in SLMCPR for PBAPS, Unit 2 Cycle 19 results from a flatter power distribution, enabled by the reduction in enrichment in the GNF2 bundles. The PBAPS, Unit 2 GNF2 fuel designs [[

]] Further, it is known that the use of the MCPR correlation, GEXL17, for GNF2 will result in [[

]] The previously noted mechanisms combined to push the SLMCPR increase into the higher range of expectations.

Background for RAI-06.1 – RAI-06.3:

GNF2 fuel is a new fuel design with a 10x10 fuel rod assembly but with features that differ from the traditional 10x10 fuel design. The PBAPS, Unit 2 Cycle 19 core loading pattern includes GNF2 fuel assemblies, but there are no GNF2 data used in the approved methodologies listed in Section 1.0, "Methodology," of Attachment 4. As noted in Section 2.5, "Methodology Restrictions," of Attachment 4, the NRC safety evaluation for Topical Reports NEDC-32601P and NEDC-32694P and Amendment 25 to NEDE-24011-P-A (ADAMS Accession No. ML003740119) contains four restrictions that should be addressed in the LAR for the use of GNF2 fuel.

RAI-06.1: Provide an evaluation with regard to the use of GNF2 fuel for the four restrictions referenced in Section 2.5 of Attachment 4.

GNF RESPONSE: The four restrictions for GNF2 were determined acceptable by the NRC review of the "GNF2 Advantage Generic Compliance with NEDE-24011-P-A (GESTAR II), NEDC-33270P, Revision 0, FLN-2007-011, March 14, 2007." Specifically, in the NRC audit report ML081630579 for the said document, Section 3.4.1 page 59 states:

> "The NRC staff's SE of NEDC-32694P-A (Reference 69 of NEDE 33270P) provides four actions to follow whenever a new fuel design is introduced. These four conditions are listed in Section 3.0 of the SE. The analysis and evaluation of the GNF2 fuel design was evaluated in accordance with the limitations and conditions stated in the NRC staff's SE, and is acceptable."

Additionally, the NRC audit report, ML081630579, Section 3.4.2.2.1 page 59 states:

> "The NRC staff finds that the calculational methods, evaluations and applicability of the OLMCPR and SLMCPR are in accordance with existing NRC-approved methods and thus valid for use with the GNF2 fuel."

RAI-06.2: Provide a description that explains under what conditions the methodologies listed in Section 1.0 of Attachment 4 are applied to the PBAPS Unit 2 Cycle 19 application.

GNF RESPONSE: There are 4 references listed in Section 1.0 of Attachment 4. The applicability of each of the four references is discussed. The four references are:

A. NEDC-32601P-A "Methodology and Uncertainties for Safety Limit MCPR Evaluations" (August 1999).

B. NEDC-32694P-A "Power Distribution Uncertainties for Safety Limit MCPR Evaluations" (August 1999).

C. NEDC-32505P-A "R-Factor Calculation Method for GE11, GE12 and GE13 Fuel" (Revision 1, July 1999).

D. NEDO-10958-A "General Electric BWR Thermal Analysis Basis (GETAB): Data, Correlation and Design Application" (January 1977).

Attachment 4 Table 2 identifies the actual methodologies used for the Cycle 18 and the Cycle 19 SLMCPR calculations. References A and B are directly applicable to the analysis.

Reference C is the generic R-Factor methodology report that describes the changed methodology that was adopted after part length rods were introduced. The NRC staff's SE for NEDC-32505P-A has a requirement that the applicability of the R-Factor methodology is confirmed when a new fuel type is introduced. The confirmation for GNF2 was determined to be acceptable by the NRC staff review of the "GEXL17 Correlation for GNF2 Fuel, NEDC-33292P, Revision 0, FLN-2007-011, March 14, 2007" in the NRC audit report ML081630579, Section 3.5.5 page 62.

Reference D is not used for this specific analysis.

RAI-06.3: Explain the difference between the critical power uncertainty values for GNF2 fuel and GE14 fuel as shown in Table 6 of Attachment 4.

GNF RESPONSE: It should be noted that correlation uncertainty, or standard deviation, for GEXL correlations tends to be in the range of [[ ]]. There is no definitive explanation for the higher uncertainty with GEXL17. While it is acknowledged that the GEXL17 standard deviation is slightly higher than that associated with GEXL14, the absolute magnitude remains typical and GEXL17 adequately predicts the onset of boiling transition for GNF2.

RAI-07: Provide an approximation of the correlation for the MCPR Importance Parameter (MIP) and the R-Factor Importance Parameter (RIP), including applicable fuel related coefficients and constants, leading to the results of the TLO SLMCPR estimate using the MIPRIP Correlation shown in Table 3 of Attachment 4.

GNF RESPONSE: The correlation provides an estimate to check the reasonableness of the Monte Carlo result. It is not used for any other purpose. The methodology and final SLMCPR is based on the rigorous Monte Carlo analysis. The MIP formulation is provided in NEDC-32601P-A. RIP is similarly formulated, but is in terms of bundle R-Factor rather than MCPR. A description of the correlation used for SLMCPR estimation using the MIPRIP correlation is provided below.

[[

]]

RAI-08: Provide a justification that the approximation determined for RAI-07 is still applicable to GNF2 fuel since there are no GNF2 data points in Figure 5 of Attachment 4.

GNF RESPONSE: The 10x10 GE14 and GNF2 data points from several cases are added to Figure 5 of Attachment 4. Also updated are the lattice configurations (e.g. 8x8, 9x9, 10x10) of each fuel product line.
[[

]]

Background for RAI-09.1 – RAI-09.2:

Section 2.1, "Major Contributors to SLMCPR Change," states that Table 3 presents estimated impacts on the TLO SLMCPR due to methodology deviations, penalties, and/or uncertainties deviations from approved values.

RAI-09.1: Provide calculation details and justify that the results listed in Table 3 are conservative related to methodology deviations, penalties, and/or uncertainties deviations from approved values.

GNF RESPONSE: The intent of the correlation is to provide an estimate to check the reasonableness of the Monte Carlo result. It is not used for any other purpose. The methodology and final SLMCPR is based on the rigorous Monte Carlo analysis. The results are conservative because: (1) the uncertainties are increased relative to the approved methodology values, and (2) consequently, the SLMCPR estimate increases as the result of the increased uncertainties.

There are three items in Table 3 that result in the increase of the estimated SLMCPR: (1) R-Factor, (2) Core Flow Rate, and (3) LPRM Update. These items are discussed below.

(1) The R-Factor uncertainty increase is discussed in Section 2.2.1 of Attachment 4. It accounts for an increase in channel bow due to the phenomena called control blade shadow corrosion-induced channel bow, which is not accounted for in the channel bow uncertainty component of the approved R-Factor uncertainty. Reference 4 of Attachment 4 provides the technical justification for this increase.

(2) The core flow rate uncertainty increase, and the associated random effective TIP reading uncertainty increase, is discussed in Section 2.2.2 of Attachment 4. The treatment of the core flow uncertainty is based on the assumption that the signal to noise ratio deteriorates as core flow is reduced. It is assumed that the absolute uncertainty remains the same as the flow decreases so that the percentage uncertainty increases inversely proportional to the change in core flow. This is conservative relative to the core flow uncertainty since the variability in the absolute flow is expected to decrease as the flow decreases. The magnitudes of the estimated impacts were determined by generic Monte Carlo sensitivity studies to the respective uncertainties.

(3) The LPRM update uncertainty increase is discussed in Section 2.2.3 of Attachment 4. It is performed to adequately address the LPRM update/calibration interval in the PBAPS, Unit 2 Technical Specifications. The NRC approved this change in Amendment No. 266 (February 29, 2008) to Renewed Facility Operating License No. DPR-44 for the PBAPS, Unit 2.

RAI-09.2: Provide a justification that all affected factors including any fuel related Part 21 issues are reflected in Table 3.

GNF RESPONSE: The GNF2 bent spacer wing related Part 21 does not apply to the GNF2 fuel in PBAPS, Unit 2 Cycle 19 because all GNF2 fuel to be loaded in this cycle has been inspected and confirmed to have no bent spacer wings as described in the Part 21.

ENCLOSURE 3

JMD-EXN-HE0-10-020

Response to NRC RAI's for Peach Bottom Atomic Power Station Unit 2
Cycle 19 SLMCPR Submittal

Affidavit

Global Nuclear Fuel – Americas

AFFIDAVIT

I, Anthony P. Reese, state as follows:

(1) I am Manager, Reload Design and Analysis, Global Nuclear Fuel–Americas, LLC ("GNF-A"), and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in Enclosure 1 of GNF's letter, JMD-EXN-HE0-10-020, J. M. Downs (GNF-A) to J. Tusar (Exelon Nuclear), entitled "GNF Response to NRC RAI's for Peach Bottom Atomic Power Station Unit 2 Cycle 19 SLMCPR Submittal", July 15, 2010. GNF-A proprietary information in Enclosure 1, which is entitled "Response to NRC RAI's for Peach Bottom Atomic Power Station Unit 2 Cycle 19 SLMCPR Submittal", is identified by a dotted underline inside double square brackets. [[This sentence is an example.{3}]] A "[[" marking at the beginning of a table, figure, or paragraph closed with a "]]" marking at the end of the table, figure or paragraph is used to indicate that the entire content between the double brackets is proprietary. In each case, the superscript notation {3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner or licensee, GNF-A relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for "trade secrets" (Exemption 4). The material for which exemption from disclosure is here sought also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

(4) Some examples of categories of information which fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GNF-A's competitors without license from GNF-A constitutes a competitive economic advantage over other companies;

b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information which reveals aspects of past, present, or future GNF-A customer-funded development plans and programs, resulting in potential products to GNF-A;

d. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b. above.

(5) To address 10 CFR 2.390 (b) (4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GNF-A, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GNF-A, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or subject to the terms under which it was licensed to GNF-A. Access to such documents within GNF-A is limited on a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GNF-A are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

(8) The information identified in paragraph (2) is classified as proprietary because it contains details of GNF-A's fuel design and licensing methodology.

The development of the methods used in these analyses, along with the testing, development and approval of the supporting methodology was achieved at a significant cost, on the order of several million dollars, to GNF-A or its licensor.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GNF-A's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GNF-A's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical, and NRC review costs comprise a substantial investment of time and money by GNF-A.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GNF-A's competitive advantage will be lost if its competitors are able to use the results of the GNF-A experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GNF-A would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GNF-A of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed on this 15th day of July 2010.

Anthony P. Reese
Manager, Reload Design and Analysis
Global Nuclear Fuel – Americas, LLC